2.3 INTEC INJECTION WELL

2.3.1 Current Status of the INTEC Injection Well

The former INTEC injection well (site CPP-23) has been sealed since the fall of 1989. The only activities associated with the well are the eight downgradient U.S. Geological Survey (USGS) monitoring wells, which have been used to sample for contaminants in the portion of the Snake River Plain Aquifer (SRPA) inside the INTEC security fence. The operational history of the injection well is discussed at length in Section 2.3.2.

Additional information on contaminants associated with the well is provided in Section 3.1.2. This information is presented to provide information about the well and is not intended to address all that has been documented on the injection well. The following documents provide at length information on the injection well: Track 2 Summary for the CPP-23 Injection Well (WINCO 1993, 1994), OU 3-13 RI/BRA (DOE-ID 1997a), RI/FS (DOE-ID 1997b) and ROD (DOE-ID 1999a).

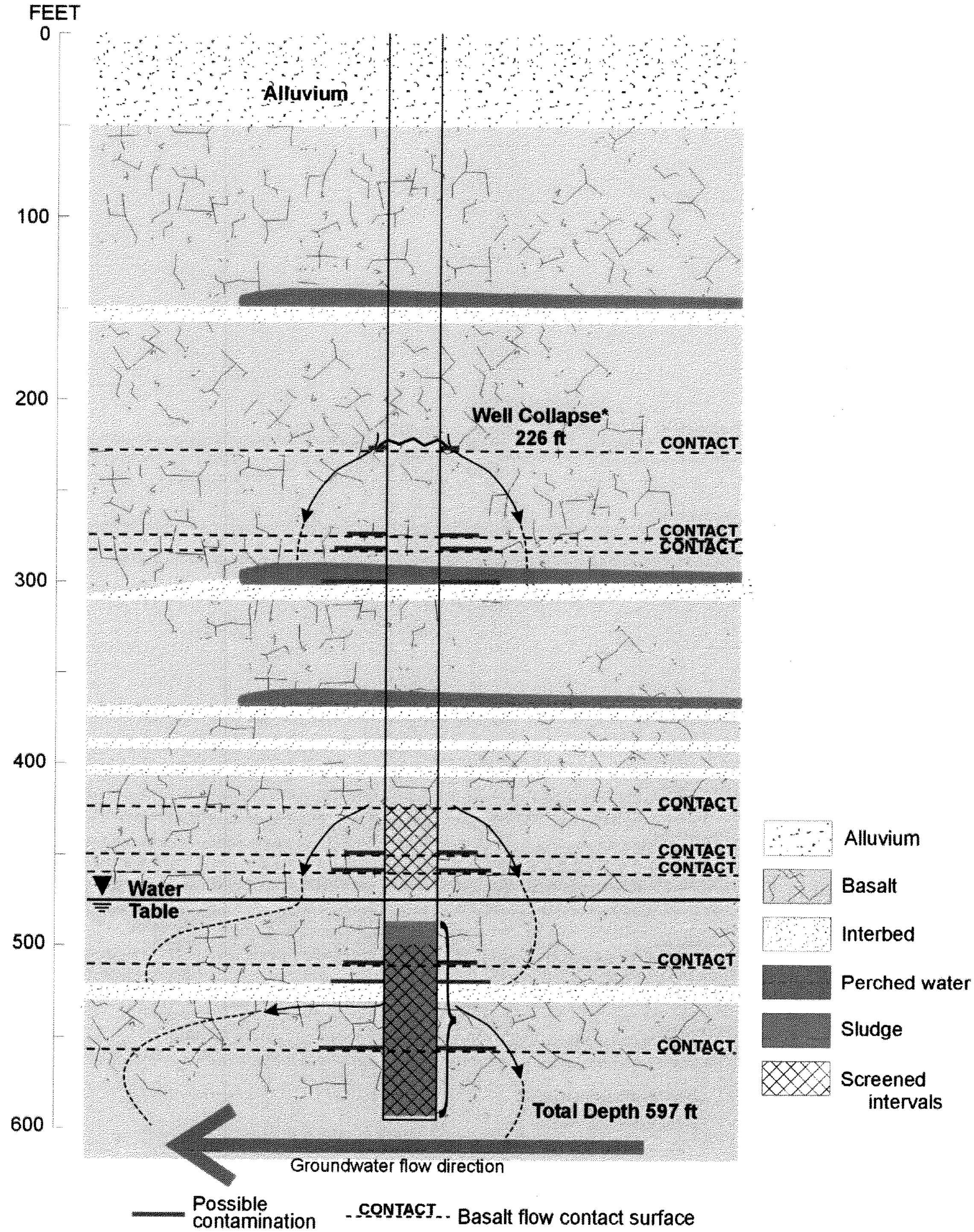
2.3.2 Operational History of the Injection Well

The former INTEC injection well (site CPP-23), located north of the FAST facility (CPP-666) and 500 ft south of the south end of the Fuel Processing Facility (CPP-601) and 100 ft east of the road to the Fuel Storage Basin (CPP-603), was used from 1952 to February 1984 to discharge small quantities of low-level radioactive and chemical waste to the SRPA. Early references to the well identify it as Well MEH-FE-PL-304 or merely Well CPP-304 (WINCO 1990e; ENICO 1981). The well currently is identified as CPP-03 by INEEL hydrogeologic data repository. Throughout the Work Plan, the well will be referred to as site CPP-23, using its CERCLA designation, except occasionally when the well alone (not the site) must be identified; in which case it will be referred to as CPP-03. The INTEC injection well was drilled in 1950 to a depth of 64.6 m (212 ft) and deepened in 1951 to 182 m (597 ft).

According to the Radioactive Waste Management Information System (RWMIS) database, a total of 22,200 Ci is estimated to have been released to the aquifer in 42 billion L (11 billion gal) of water. The database provides a qualitative estimate of the activity and volume of wastewater discharged to the injection well. Based on drinking water standards, the major radionuclides of concern disposed of to the injection well were H-3 and Sr-90. Tritium is estimated to account for 96% of the total radioactivity released to the aquifer. During a 3-month period in 1985, H-3, a major component of waste streams from fuel reprocessing activities, accounted for 99.5% of the total quantity of radioactivity in service waste effluent (WINCO 1986b). A conceptual model of the injection well is provided in Figure 2-11. Plots of the disposal history of H-3 to the INTEC injection well are provided in Figure 2-12.

The wastewater also contained low concentrations of various chemicals. A summary of the total curies discharged to the injection well for each radionuclide, including the curies remaining after radioactive decay, is provided in Table 2-4 (DOE-ID 1997a).

The well extends 42.7 m (140 ft) beneath the top of the SRPA. A 61-cm (24-in.) diameter borehole was drilled and cased using 41-cm (16-in.) nominal diameter carbon steel casing. The annular space between the borehole and casing was filled with gravel. The well casing was perforated from 125.6 to 137.8 m (412 to 452 ft) and from 149.4 to 180.7 m (490 to 593 ft) below ground surface (bgs). The well casing is a 300.8 m (12-in.) diameter carbon steel pipe lined with a 10-in. polyvinyl chloride pipe for protection against corrosion effects resulting from exposure to warm water and air. The upper portion of the well is a 2.4–m (8-ft) square diameter concrete chamber surrounding the casing. A 1.2 m (4-ft) diameter manhole rises above ground level above the chamber (ENICO 1981).



* The collapse likely took place in early 1968 and was discovered in June 1970. 900 million gallons may have been released at the 226 ft depth (2½ years X 363 million gal/year) (WINCO 1992).

Figure 2-11. Conceptual model of the INTEC injection well (Site CPP-23).

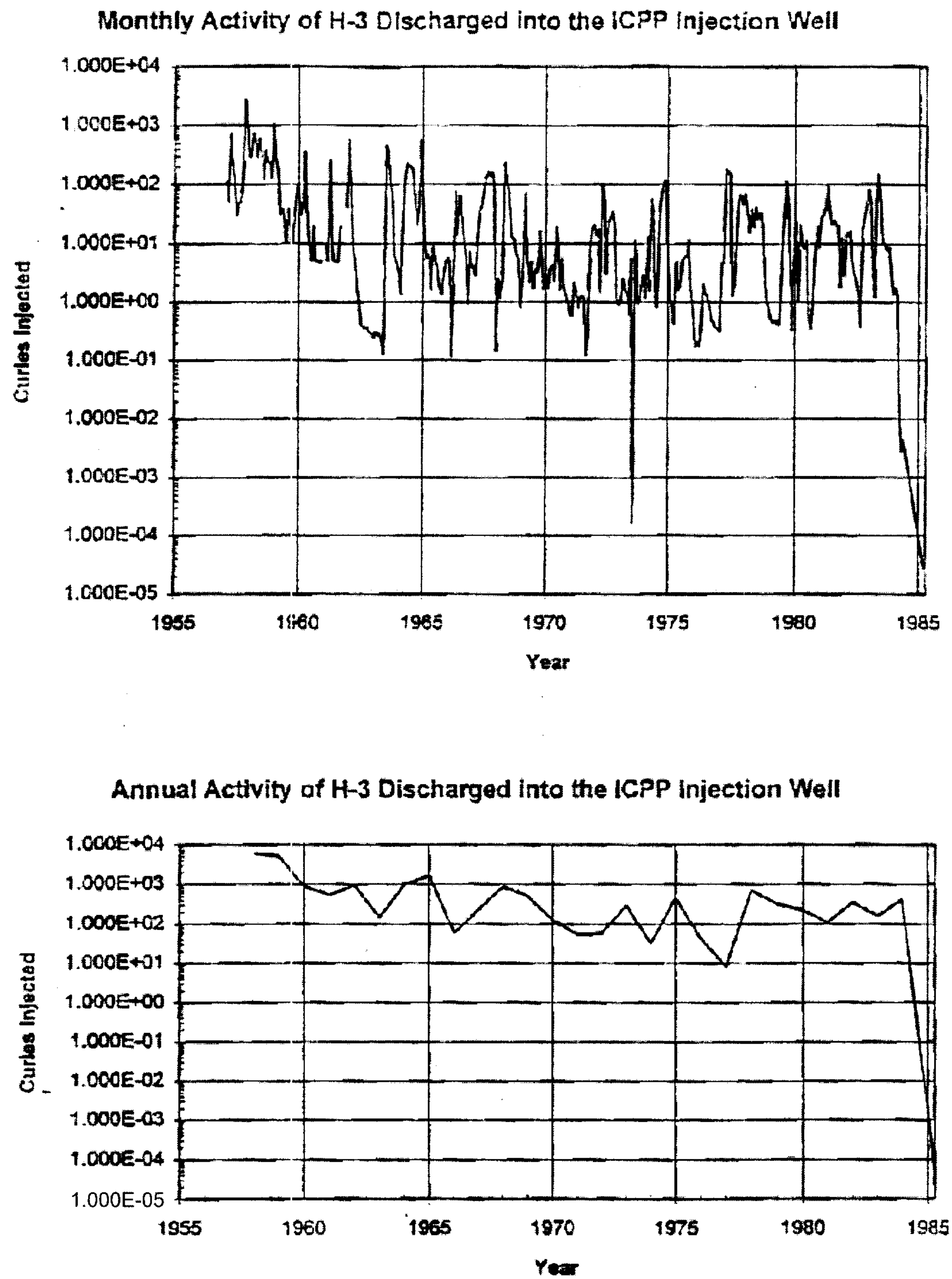


Figure 2-12. Monthly and annual radioactivity of H-3 discharged to the INTEC injection well (DOE-ID 1997).

Table 2-4. Summary of the total curies discharged to the INTEC injection well (Site CPP-23).

Radionuclide	Half-Life (years)	Total Activity Injected (Ci)	Total Activity Remaining[a] (Ci)	Percent of Injected Activity Remaining (after decay)	Percent of the Current Activity
Ag-110m	6.80E-01	8.36E-05	1.34E-12	0.0	0.00
Am-241	4.33E+02	3.17E-04	3.08E-04	97.2	0.00
Ba-140	3.49E-02	5.05E-04	8.86E-156	0.0	0.00
C-14	5.73E+03	1.27E-01	1.27E-01	99.8	0.00
Ce-141	8.90E-02	1.68E-04	3.19E-61	0.0	0.00
Ce-141/144	7.80E-01	1.16E-01	2.42E-14	0.0	0.00
Ce-144	7.80E-01	1.75E+01	2.07E-06	0.0	0.00
Co-57	7.40E-01	6.54E-03	8.91E-09	0.0	0.00
Co-60	5.27E+00	1.49E-01	8.77E-03	5.9	0.00
Cr-51	7.59E-02	5.37E-03	2.91E-67	0.0	0.00
Cs-134	2.06E+00	1.50E+00	2.03E-03	0.1	0.00
Cs-137	3.02E+01	2.05E+01	1.19E+01	57.8	0.30
Cs-138	6.10E-05	2.50E-01	0.00E+00	0.0	0.00
Eu-152	1.36E+01	8.12E-02	4.36E-02	53.7	0.00
Eu-154	8.80E+00	8.38E-02	2.95E-02	35.2	0.00
Eu-155	4.95E+00	2.22E-02	3.43E-03	15.5	0.00
H-3	1.23E+01	2.13E+04	3.89E+03	18.2	99.44
Hg-203	1.28E-01	7.33E-05	3.10E-42	0.0	0.00
I-129	1.70E+07	2.78E-01	2.78E-01	100.0	0.01
I-130	1.41E-03	2.98E+01	4.38E-152	0.0	0.00
K-40	1.28E+09	2.81E-12	2.81E-12	100.0	0.00
La-140	4.60E-03	6.22E-04	0.00E+00	0.0	0.00
Mn-54	8.30E-01	6.55E-03	7.02E-08	0.0	0.00
Nb-95	9.58E-02	4.63E-01	4.17E-35	0.0	0.00
Np-237	2.14E+06	5.48E-03	5.48E-03	100.0	0.00
Pr-144	3.29E-05	4.47E-01	0.00E+00	0.0	0.00
Pu-238	8.77E+01	1.32E-01	1.15E-01	87.1	0.00
Pu-239	2.44E+04	1.05E-02	1.04E-02	99.9	0.00
Pu-239/240	2.44E+04	3.74E-02	3.74E-02	99.9	0.00
Pu-240	6.57E+03	1.14E-03	1.14E-03	99.8	0.00
Rn-106	9.48E-07	4.81E+00	0.00E+00	0.0	0.00
Ru-103	1.10E-01	1.45E-01	4.59E-37	0.0	0.00
Ru-106	1.02E+00	1.70E+01	6.85E-04	0.0	0.00
Sb-124	1.65E-01	2.41E-04	5.02E-36	0.0	0.00

Table 2-4. (continued).

Radionuclide	Half-Life (years)	Total Activity Injected (Ci)	Total Activity Remaining[a] (Ci)	Percent of Injected Activity Remaining (after decay)	Percent of the Current Activity
Sb-125	2.77E-00	1.86E+00	1.22E-02	0.7	0.00
Sr-85	1.73E-01	9.14E-05	1.78E-23	0.0	0.00
Sr-89	1.40E-01	5.59E+00	4.51E-27	0.0	0.00
Sr-89/90	2.91E+01	1.31E+00	6.40E-01	48.8	0.02
Sr-90	2.91E+01	1.60E+01	8.75E+00	54.8	0.22
U-234	2.45E+05	2.28E-02	2.28E-02	100.0	0.00
U-235	7.04E+08	1.94E-03	1.94E-03	100.0	0.00
U-236	2.34E+07	4.09E-04	4.09E-04	100.0	0.00
U-238	4.46E+09	6.81E-03	6.31E-03	100.0	0.00
Y-90	7.31E-03	1.32E+00	0.00E+00	0.0	0.00
Zn-65	6.67E-01	4.65E-04	1.39E-11	0.0	0.00
Zr-95	1.78E-01	2.34E-01	2.53E-23	0.0	0.00
Zr/Nb-95	9.57E-02	2.06E+01	1.38E-43	0.0	0.00
Unidentified Alpha	—	6.36E-01	—	—	—
Unidentified Beta-Gamma	—	5.82E+01	—	—	—
Others[b]	—	6.33E+02	—	—	—
	Total	2.22E+04	3.92E+03	—	100.0

a. Decayed to January 1, 1995.
b. Estimate of radionuclides other than H-3 from 1957 to 1962 assuming 95.5% of the total curies is H-3 (Barraclough 1967).

The well was in service from 1952 to 1984 for the disposal of service wastewater containing small quantities of radioactivity and inorganic contaminants. The well injected the service wastewater to the SRPA through a 254-mm (10-in.) line (ENICO 1981). During routine operation, process solution containing radioactivity concentrations of 850 μCi/gal or higher automatically were diverted to the service waste diversion tank VES-191. The average discharge to the well during this period was about 1.4 billion L/year (363 million gal/year) or about 3.8 million L/day (1 million gal/day). The monthly volume of wastewater that was discharged from 1951 to 1984 to the INTEC injection well is shown in Figure 2-13. The available data for 1953 to 1961 are yearly totals and are plotted by assuming equal volumes discharged every month (DOE-ID 1997a).

In June 1970 when a defective measuring line in the injection well was replaced, the well was found to have collapsed so that it was plugged at a depth of 68.9 m (226 ft). As a result, wastewater was being injected into the unsaturated zone (vadose zone) above 68.9 m (226 ft) (WINCO 1990e). The wastewater discharge to the disposal well was warm (65° to 70°F) and salty (the chloride content averaged approximately 200 to 250 mg/L). The salty, aerated wastewater apparently corroded the casing until it collapsed, allowing the gravel pack and intruding sediment (sludge) to fill the well up to the 68.9-m (2260ft) depth. Only fragmentary corroded pieces of the original 41-cm (16-in.) casing were left, as indicated by caliper logs and first attempts at cleaning the well. Measurements, made in 1966, showed that the well was still intact. Therefore, most of the collapse took place in 1967 or early 1968. Levels of H-3 and Sr-90, measured in Well USGS-50 in 1969 and 1990, are additional evidence supporting this timeframe (DOE-ID 1997a).

In September 1970, a drilling contractor began to redrill and reline the injection well to its original depth. By October, deepening had progressed to about 152.4 m (500 ft) and the water level in the well had resumed its normal depth at about 138.7 m (455 ft). During this period of well rehabilitation, wastewater was disposed of to USGS-50. During or after these well rehabilitation operations, the well is assumed to have collapsed again and was reopened to the water table in late 1982. At this time, a high-density polyethylene line 2.5 cm (1 in.) thick was placed in the well from ground level to the bottom of the well. The liner was perforated from 137 m (450 ft) bgs, approximately 6.1 m (20 ft) above the water table 143.3 m (470 ft) to the bottom of the well (WINCO 1986b). The depth of the HI interbed is 158.5 to 167.6 m (520 to 550 ft) under INTEC and 158.5 to 164.6 m (520 to 540 ft) in the vicinity of the injection well.

On February 7, 1984, the injection well was taken out of routine service and wastewater has been pumped from two parallel collection vaults to percolation ponds 1 and 2. Disposal of wastewater decreased in 1985 and 1986. The injection well also served as an emergency overflow protection for two service waste monitoring stations (CPP-709 and CPP-734) and another service waste building (CPP-797). These three buildings contain the vaults from which the service wastewater is monitored and pumped. The overflow protection was required only on a temporary basis if the operating and standby pumps from one of the parallel streams failed simultaneously. All the lines have been plugged and can no longer be used to route service wastewater overflow from the vaults in the buildings.

In 1986, modifications were made to the injection well entry, which further decreased use of the well, resulting in a decrease to approximately 12,200 L (3,220 gal) to the injection well in 1986. No releases have occurred to the well since 1986 (DOE-ID 1997a).

In October and November 1989, the injection well was sealed by perforating the casing throughout and pumping in cement. The well was sealed from the basalt silt layer (145 m [475 ft] bgs) to land surface to prevent hydraulic communication between the land surface, perched water, and SRPA (DOE-ID 1997a).

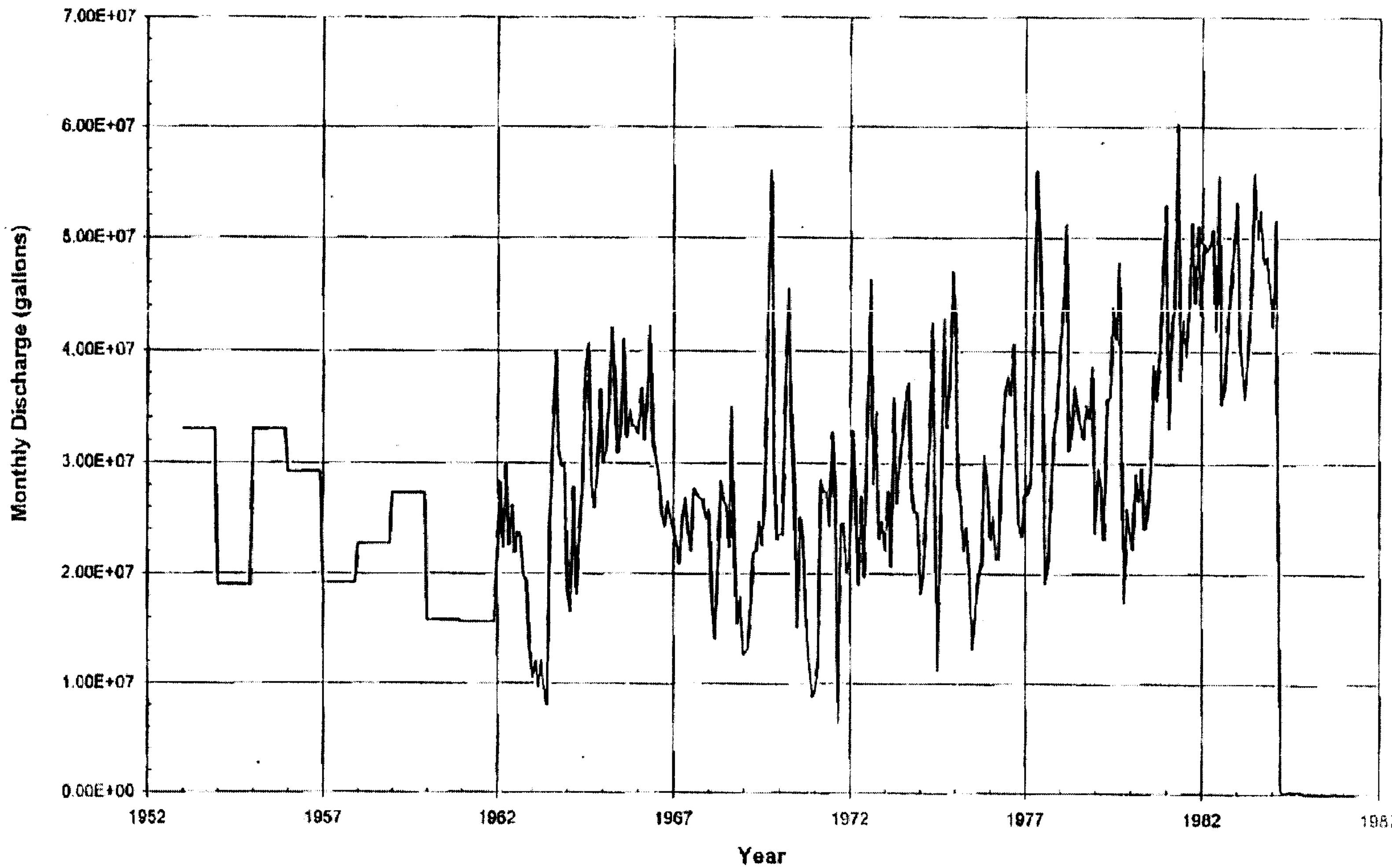


Figure 2-13. Monthly wastewater discharge to the INTEC injection well (DOE-ID 1997).

Since the contamination from the INTEC injection well may be both in the aquifer and in the vadose zone, the impact on the aquifer water quality has been monitored for the past 40 years by the USGS. Existing aquifer monitoring data are not sufficient to demonstrate that this sediment (sludge) or other residuals from injection do not pose a long-term risk to human health.

Well USGS-50 was originally intended to be completed in the aquifer, but ultimately was drilled only to a total depth of 123 m (405 ft) to monitor a deep perched-water zone. This well is located in the north-central portion of the facility to the south of the northern perched-water zone and upgradient from the INTEC injection well. According to the historical water quality data, the highest concentrations of H-3 and Sr-90 occurred in 1969 and 1970. These elevated concentrations were attributed to the failure of the INTEC injection well, causing the wastewater to be injected into the vadose zone rather than directly to the aquifer. Based on the response observed in Well USGS-50 and injection well records, the well apparently failed in mid-1967 and allowed approximately 3.41×10^9 L (9.0×10^8 gal) of wastewater to be injected into the basalt above the 69-m (226-ft) plug (Robertson et al. 1974). The INTEC injection well was repaired by early 1971. It failed again in the 1970s and was repaired in 1982 (DOE-ID 1997a).

Since 1970, H-3 and Sr-90 concentrations have varied little between sampling events, and indicate an overall slight decrease with time. Two periods of slight increase are noted with the first period occurring from the late 1970s until 1982 and the second period from late 1986 to early 1988. The first period of increase (from approximately 1978 to 1982) was probably the result of the injection well failing and injecting wastewater directly into the vadose zone. Exactly when the injection well failed the second time is uncertain; however, it was reportedly repaired by 1982. The second period of increase, from late 1986 to early 1988, is after the injection well was taken out of service. The increase in Sr-90 concentrations during this period suggests either a local, post-disposal well source or a delay in the migration of contamination from a near-surface source. Water from overlying perched water has been observed leaking into the wellbore through the annular space. This mixing of water from two perched water zones places additional uncertainty on the representativeness of the water quality data from USGS-50. The leaky borehole annulus was repaired during the Fiscal Year 1994 field season (DOE-ID 1997a).

From the May 1995 water sampling of USGS-50, the concentrations of all chemical contaminants except nitrate/nitrite were below federal primary or secondary maximum contaminant levels (MCLs). The concentration of nitrate/nitrite was measured at 31.3 mg/L, where as the federal primary MCL is 10 mg/L. Radionuclides in the groundwater that were detected include H-3 (61,900 ± 700 pCi/L), Sr-90 (151 ± 2 pCi/L), and Tc-99 (63 ± 1 pCi/L). The concentrations for H-3 and Sr-90 are within the expected values based on the historical sampling conducted by the USGS (DOE-ID 1997a). At this writing, the MCLs for H-3, Sr-90, and TC-99 are 20,000 pCi/L, 8 pCi/L, and 900 pCi/L, respectively, although changes have been proposed.

2.3.2.1 History of Known Discharges to the Injection Well. During the INTEC operational life, known accidental discharges to the injection well occurred and are described below (WINCO 1992).

July 1953—The contents of a tank discharged to the wastewater flowing to the well. A post-discharge analysis showed that 51 mCi of radioactive contaminants were released in 923,640 L (244,000 gal) of water.

December 1958—About 29 Ci of radioactive contaminants, including 7 Ci of Sr-90, were released to the well.

September 1969—Two separate releases, resulting in 19 Ci of fission products, were released to the well. Releases included Cs-137, Cs-134, Ce-144, and Sb-125 in 12.4×10^6 L (3.28×10^6 gal) of wastewater.

December 1969—Two releases occurred in which the quantity of Sr-90 released was higher than expected. About 1 Ci, including 30% Sr-90, was released.

March 1981—Mercury was detected during routine monitoring of the INTEC service waste system. Mercury in the form of mercuric nitrate was released from the Fuel Processing Building (CPP-601) through the INTEC service waste system to the INTEC injection well. An estimated 0.207 mg/L of mercury was detected in service waste. The RCRA EP toxicity limit for mercury is 0.2 mg/L.

Soluble mercury, as mercuric nitrate, is used as a catalyst in certain INTEC fuel dissolution processes. These operations are the only ones in which significant quantities of soluble mercury have been used at the INTEC. In March 1981, a batch of catalyst was mixed, then found to contain solids. The solution was discarded and it is assumed that it was drained to the waste system. Assuming the worst-case scenario of draining one batch of catalyst, the maximum catalyst lost would be 250 L (66 gal) of solution containing 15 kg (33 lbs) of mercury (DOE-ID 1997a).

2.3.2.2 Monitoring. Eight monitoring wells within 0.40 km (0.25 mi) and downgradient of the injection well have been established by the USGS. Though the dispersion of waste plumes laterally and longitudinally is typical, little vertical dispersion is apparent because of relatively low vertical permeability and apparent lower permeability at depths greater than about 76.2 m (250 ft) below the water table. Analyses of water samples, collected from USGS wells downgradient of INTEC, indicated detectable mercury concentrations (0.2 μg/L) in three USGS wells (USGS-36, USGS-37, and USGS-41). Because heavy metal analysis is not conducted by the USGS on a regular frequency, it is not certain whether these analyses indicate detectable mercury because of the March 1981 injection well release (DOE-ID 1997a).

A sample of the sediment within the injection well was collected on August 31, 1989. The only organic compound detected above method detection limit (MDL) in this sediment sample was polychlorinated biphenyls (PCB) 1260 (Aroclor). However, the sample was collected from the top of the sediment column in the injection well and may not be representative of contaminants and concentrations at deeper intervals of the column. Aroclor was detected at a concentration of 10 μg/kg. The minimum detectable limit is 8.3 μg/kg. Downgradient monitoring wells were sampled and PCB was not indicated. Radionuclide analyses of sediments taken from the injection well indicated beta activity at 150 pCi/g and three radionuclides: Cs-137 at 100 pCi/g, Eu-152 at 3.8 pCi/g, and Eu-154 at 2.5 pCi/g (DOE-ID 1997a).

2.4 Physical Setting

2.4.1 Physiography

The INEEL is located in the Eastern Snake River Plain (ESRP), the largest continuous physiographic feature in southern Idaho. This large topographic depression extends from the Oregon border across Idaho to Yellowstone National Park and northwestern Wyoming. The ESRP, the eastern-most extension of the Columbia River Plateau Province (EG&G 1988), slopes upward from an elevation of about 762 m (2,500 ft) at the Oregon border to more than 1,981 m (6,500 ft) at Henry's Lake near the Montana-Wyoming border (Becker et al. 1998).

The INEEL is located entirely on the northern side of the ESRP and adjoins the Lost River, Lemhi, and Beaverhead mountain ranges to the northwest, which compose the northern boundary of the plain. The portion of the ESRP occupied by the INEEL may be divided into three minor physical provinces: a central trough that extends from southwest to northeast through the INEEL and two flanking slopes that descend to the trough, one from the mountains to the northwest and the other from a broad lava ridge on the plain to the southeast. The slopes on the northwestern flank of the trough are mainly alluvial fans originating from sediments of Birch Creek and the Little Lost River. Also forming these gentle slopes are basalt flows that spread onto the plain. The land formations on the southeast flank of the trough were created by basalt flows that spread from an eruption zone that extends northeastward from Cedar Butte. The lavas that erupted along this zone built up a broad topographic swell directing the Snake River to its current course along the southern and southeastern edges of the plain. This ridge effectively separates the drainage of mountain ranges northwest of the INEEL from the Snake River. Big Southern Butte and the Middle and East buttes are aligned roughly along this zone; however, they were formed by viscous rhyolitic lavas extruded through the basaltic cover and are slightly older than the surface basalts of the plain.

With the exception of the buttes on the southern border of the INEEL, elevations on the INEEL range from 1,460 m (4,790 ft) in the south to 1,802 m (5,913 ft) in the northeast with an average elevation of 1,524 m (5,000 ft) above sea level (EG&G 1988). The East, Middle, and Big Southern buttes have elevations of 2,003 m (6,571 ft), 1,948 m (6,389 ft), and 2,304 m (7,559 ft) above sea level, respectively (VanHorn, Hampton, and Morris 1995).

The central lowland of the INEEL broadens to the northeast and joins the extensive Mud Lake Basin. The Big and Little Lost rivers and Birch Creek drain into this trough from valleys in the mountains to the north and west. The intermittently flowing waters of the Big Lost River have formed a flood plain in this trough, consisting primarily of sands and gravels. The streams intermittently flow to the Lost River Sinks, a system of playa depressions (ephemeral lakes that have water only during parts of the year or once in several years) in the northern portion of the INEEL, east of the town of Howe, Idaho. There, the water evaporates, transpires, or recharges the SRPA. The sinks area covers several hundred acres and is flat, consisting of significant thicknesses of fluvial and lacustrine sediments.

INTEC is located in the south-central portion of the INEEL. Elevation at INTEC is 1,498 m (4,917 ft), and the facility's northwest corner is actually truncated by the current channel of the Big Lost River. Gravelly, medium-to-coarse textured soils derived from alluvial deposits occur in the INTEC vicinity. The underlying basalt is covered with as much as 18.2 m (60 ft) of these soils and the land surface is flat and covered with sagebrush.

2.4.2 Meteorology and Climatology

Meteorological and climatological data for the INEEL and the surrounding region are collected and compiled from several meteorological stations operated by the National Oceanic and Atmospheric Administration (NOAA) field office in Idaho Falls, Idaho. Three stations are located on the INEEL: one at the Central Facilities Area (CFA), one at TAN, and one at the Radioactive Waste Management Complex (RWMC).

2.4.2.1 Precipitation. The location of the INEEL in the ESRP, including altitude above sea level, latitude, and intermountain setting, affects the climate of the site. Air masses crossing the plain have first traversed a mountain barrier and precipitated a large percentage of inherent moisture. Therefore, annual rainfall at the INEEL is light, and the region is classified as arid to semiarid (Clawson, Start, and Ricks 1989). Average annual precipitation at the INEEL is 22.1 cm (8.7 in.). The rates of precipitation are the highest during the months of May and June and the lowest in July. Normal winter snowfall occurs from November through April, though occasional snowstorms occur in May, June, and October. Snowfall at the INEEL ranges from a low of about 17.3 cm (6.8 in.) per year to a high of about 151.6 cm (59.7 in.) per year, and the annual average is 70.1 cm (27.6 in.) (Clawson, Start, and Ricks 1989).

2.4.2.2 Temperature. The moderating influence of the Pacific Ocean produces a climate at the INEEL that is usually warmer in the winter and cooler in summer than is found at locations of similar latitude in the United States to the east of the Continental Divide. The Centennial Mountain Range and Beaverhead Mountains of the Bitterroot Range, both north of the INEEL, act as an effective barrier to the movement of most of the intensely cold winter air masses entering the United States from Canada. Occasionally, however, cold air spills over the mountains and is trapped in the plain. The INEEL then experiences below normal temperatures for periods lasting from seven to 10 days. The relatively dry air and infrequent low clouds permit intense solar heating of the surface during the day and rapid radiant cooling at night. These factors combine to give a large diurnal range of temperature near the ground. The average summer daytime maximum temperature is 28°C (83°F), while the average winter daytime maximum temperature is –0.6°C (31°F). During a 38-year period of meteorological records (1950 through 1988) from CFA, temperature extremes at the INEEL have varied from a low of –44°C (–47°F) in January to a high of 38°C (101°F) in July (Clawson, Start, and Ricks 1989).

2.4.2.3 Humidity. Data collected from 1956 through 1961 indicate that the average relative humidity at the INEEL ranges from a monthly average minimum of 18% during the summer months to a monthly average maximum of 55% in the winter. The relative humidity is directly related to diurnal temperature fluctuations. Relative humidity reaches a maximum just before sunrise (the time of lowest temperature) and a minimum in midafternoon (time of maximum daily temperature) (Clawson, Start, and Ricks 1989).

The potential annual evaporation from saturated ground surface at the INEEL is approximately 109 cm (43 in.) with a range of 102 – 117 cm (40 – 46 in.) (Clawson, Start, and Ricks 1989). About 80% of this evaporation occurs between May and October. During the warmest month (July), the potential daily evaporation rate is approximately 0.63 cm/day (0.25 in./day). During the coldest months (December through February), evaporation is low and may be insignificant. Actual evaporation rates are much lower than potential rates because the ground surface is rarely saturated. Evapotranspiration by the sparse native vegetation of the Snake River Plain is estimated at between 15– 23 cm/year (6–9 in./year) or four to six times less than the potential evapotranspiration. Periods when the greatest quantity of precipitation water is available for infiltration (late winter to spring) coincide with periods of relatively low evapotranspiration rates (EG&G 1981).

2.4.2.4 Wind. Wind patterns at the INEEL can be quite complex. The orientations of the surrounding mountain ranges and the ESRP play an important part in determining the wind regime. The INEEL is in the belt of prevailing westerly winds, which are channeled within the ESRP to produce a west-southwest or southwest wind approximately 40% of the time. Local mountain valley features exhibit a strong influence on the wind flow under other meteorological conditions as well. The average midspring wind speed recorded at the CFA meteorological station at 6 m (20 ft) was 9.3 mph, while the average midwinter wind speed recorded at the same location was 5.1 mph (Irving 1993).

The INEEL is subject to severe weather episodes throughout the year. Thunderstorms are observed mostly during the spring and summer. The tornado risk probability is about 7.8E-05 per year for the INEEL area (Bowman et al. 1984). An average of two to three thunderstorms occur each month from June through August (EG&G 1981). Thunderstorms are often accompanied by strong gusty winds that may produce local dust storms. Precipitation from thunderstorms at the INEEL is generally light. Occasionally, however, rain resulting from a single thunderstorm on the INEEL exceeds the average monthly total precipitation (Bowman et al. 1984).

Dust devils can entrain dust and pebbles and transport them over short distances. Common in the region, dust devils usually occur on warm sunny days with little or no wind. The dust cloud may be several hundred yards in diameter and extend several hundred feet in the air (Clawson, Start, and Ricks 1989).

2.4.3 Geology

2.4.3.1 Surface and Subsurface Geology. The surface of the INEEL is generally covered by Pleistocene and Holocene basalt flows ranging in age from 300,000 to 3 million years (Hackett, Pelton, and Brockway 1986). These basalts erupted mainly from northwest-trending volcanic rift zones, marked by belts of elongated shield volcanoes and small pyroclastic cones, fissure-fed lava flows, and noneruptive fissures or small-displacement faults (Bargelt et al. 1992). A prominent geologic feature of the INEEL is the flood plain of the Big Lost River. Alluvial sediments of Quaternary age occur in a band that extends across the INEEL from the southwest to the northeast. The alluvial deposits grade into lacustrine deposits in the northern portion of the site where the Big Lost River enters a series of playa lakes. Paleozoic sedimentary rocks make up a small area of the INEEL along the northwest boundary. Three large silicic domes (East, Middle, and Big Southern buttes) occur along the southern boundary of the INEEL, and a number of smaller basalt cinder cones occur across the site. Mountains of the Lost River, Lemhi, and Bitterroot ranges that border the northwest portion of the INEEL are Cenozoic fault-block composed of Paleozoic limestones, dolomites, and shales. The fault-block ranges trend northwest-southeast, and the volcanic rifts that parallel the ranges are believed to be surface expressions of extensions of the range-front faults (Bargelt et al. 1992).

Basalt flows in the surface and subsurface at the INEEL were formed by three general methods of plains-style volcanism, which is an intermediate style between the flood basalt volcanism of the Columbia Plateau and the basaltic shield volcanism of the Hawaiian Islands (Bargelt et al. 1992). The methods are flows forming low-relief shield volcanoes, fissure-fed flows, and major tube-fed flows with other minor flow types (Bargelt et al. 1992). The very low shield volcanoes, with slopes of about 1 degree, formed in an overlapping manner. This overlapping and coalescing of flows is characteristic of the low surface relief on the ESRP (Bargelt et al. 1992). Considerable variation in texture occurs within individual basalt flows. In general, the bases of basalt flows are glassy to fine grained and minutely vesicular. The midportions of the basalt flows are typically coarser grained with fewer vesicles than the top or bottom of the flow. The upper portions of flows are fine grained and highly fractured with many vesicles. This pattern is the result of rapid cooling of the upper and lower surfaces with slower cooling of the interior of the basalt flow. The massive interiors of basalt flows are sometimes jointed with vertical joints in a hexagonal pattern formed during cooling (Wood 1989).

During quiescent periods between volcanic eruptions, sediments were deposited on the surface of the basalt flows. These sedimentary deposits display a wide range of grain-size distributions, depending on the mode of deposition (i.e., eolian [windblown silt or sand], lacustrine, or fluvial), source rock, and length of transport. Because of the irregular topography of the basalt flows, sedimentary materials commonly accumulated in isolated depressions.

A number of wells have been drilled within the INEEL to monitor groundwater levels and water quality. Lithologic and geophysical logs were made for most of the wells. From these logs and an understanding of the volcanism of the Snake River Plain, it is possible to develop a reasonably comprehensive picture of subsurface geology. The INEEL is homogeneous in terms of the mode of formation and types of geologic units encountered. The exact distribution of units at any specific site, however, is highly variable.

2.4.3.2 ***Volcanic Hazard.*** As discussed above, the INEEL is located in a region of historical volcanic activity, typically of the nonviolent basalt volcanism variety. Five to six million years ago, explosive rhyolite volcanism occurred beneath the INEEL, but the calderas are now dead and buried beneath basalt lava flows. The youngest lava flow in the region immediately surrounding the site erupted about 4,100 years ago from the Hell's Half Acre Lava Flow to the southeast of the INEEL. The most recent lava flows within the site boundary occurred some 300,000 years ago (Hackett, Pelton, and Brockway 1986).

Renewed explosive rhyolite volcanism at the INEEL is very unlikely. Geological and geochronological data indicate an eastward progression of ESRP volcanism. The magmatic plume assumed responsible for the volcanism now is thought to lie beneath Yellowstone National Park, at which explosive rhyolite volcanism is possible. Hazards associated with falling ejecta could impact the INEEL in the remote event that such an explosion occurred at the park, but basalt flows originating at Yellowstone cannot reach the INEEL because of distance and the intervening mountainous terrain (Hackett, Pelton, and Brockway 1986).

According to Hackett, Leussen, and Ferdock (1987), past patterns of volcanism suggest that future volcanism at the INEEL within the next 1,000 to 10,000 years is very improbable. The two most likely sources of future basalt flows are the Arco-Big Southern Butte and the Lava Ridge-Hell's Half Acre rift zones. Lava from these rifts would tend to move south away from the INEEL because of the gentle negative gradient from north to south on the surface of the ESRP (Hackett, Pelton, and Brockway 1986).

2.4.3.3 ***Surficial Soils.*** The INEEL soils are derived from Cenozoic felsic volcanic and Paleozoic sedimentary rocks from nearby mountains. The soils in the northern portion of the INEEL are generally composed of fine-grained lacustrine and eolian deposits of unconsolidated clay, silt, and sand. Typically, the soils in the southern INEEL are shallow, consisting of fine-grained eolian soil deposits with some fluvial gravels and gravelly sands (EG&G 1988). Across the site, measured surficial soil thicknesses range from zero at the basalt outcroppings east of INTEC to 95 m (313 ft) near the Big Lost River Sinks southwest of TAN (Anderson, Liszewski, and Ackerman 1996).

Currently, site CPP-26, which is included in site CPP-96, is located in the 100-year flood plain, (Berenbrock and Kjelstrom 1998). To more accurately depict the limits of the 100-year flood plain, DOE is performing additional flood plain analysis that may impact the flood plain boundary in the vicinity of these two sites. In addition, ongoing construction activities as part of the OU 3-13 Tank Farm interim action (see Section 1.5.4) may change the topography and modify the boundary of the 100-year flood plain. These activities and their impact on the two sites with regard to their being in the 100-year flood plain will be reevaluated during the OU 3-14 feasibility study.

2.4.4 Hydrology

2.4.4.1 ***Surface Hydrology.*** Surface hydrology at the INEEL includes water from three streams that flow intermittently onto the INEEL and from local runoff caused by precipitation and snowmelt. Most of the INEEL is located in the Pioneer Basin into which three streams drain: the Big Lost River, the Little Lost River, and Birch Creek. These streams receive water from mountain watersheds located to the north and northwest of the INEEL. Stream flows often are depleted before reaching the INEEL by irrigation diversions and infiltration losses along stream channels. The Pioneer Basin has no outlet; thus, when water flows onto the INEEL, it either evaporates or infiltrates the ground (Irving 1993).

The Big Lost River is the major surface water feature on the INEEL. Its waters are impounded and regulated by Mackay Dam, which is located approximately 6 km (4 mi) north of Mackay, Idaho. Upon leaving the dam, waters of the Big Lost River flow southeastward past the town of Arco and onto the ESRP. Flow in the Big Lost River that actually reaches the INEEL is either diverted at the INEEL diversion dam to spreading areas southwest of RWMC or flows northward across the INEEL in a shallow channel to its terminus at the Lost River Sinks at which point the flow is lost to evaporation and infiltration (Irving 1993). Because of above-average mountain snow pack in 1995, water in the Big Lost River was sufficient during the summer of 1995 to flow to the spreading areas and sinks and to the playas south of TAN. Flow during this timeframe ranged from 13.3 m^3/second (469 ft^3/second) near RWMC in mid-July to 0.8 m^3/second (29 ft^3/second) in early August (Becker et al. 1998).

The Little Lost River drains from the slopes of the Lemhi and Lost River mountain ranges. Flow in the Little Lost River is diverted for irrigation north of Howe, Idaho, and does not normally reach the INEEL. Springs below Gilmore Summit in the Beaverhead Mountains, and drainage from the surrounding basin, are the source for Birch Creek. Flowing in a southeasterly direction between the Lemhi and Bitterroot mountain ranges, the water of Birch Creek is diverted north of the INEEL for irrigation and hydropower during the summer months. During the winter months, water not used for irrigation is returned to an anthropogenic channel on the INEEL 6 km (4 mi) north of TAN where the water infiltrates channel gravels, recharging the aquifer (Irving 1993). The surface water features of the INEEL are illustrated in Figure 2-14.

2.4.4.2 Subsurface Hydrology. Subsurface hydrology at the INEEL is discussed as three components: the vadose zone, perched water, and the SRPA. The vadose zone, also referred to as the unsaturated zone, extends from the land surface down to the water table. The water content of the geologic materials in the vadose zone is commonly less than saturation, and water is held under negative pressure. Perched water in the subsurface forms as discontinuous saturated lenses with unsaturated conditions existing both above and below the lenses. Perched water bodies are formed by vertical, and to a lesser extent, lateral migration of water moving away from a source until an impeding sedimentary layer is encountered. The SRPA, also referred to as the saturated zone, occurs at various depths beneath the ESRP. About 9% of the aquifer lies beneath the INEEL (DOE-ID 1996). The depth to the water table ranges from approximately 61 m (200 ft) in the northern part of the INEEL to greater than 274 m (900 ft) in the southern part (Irving 1993). The SRPA, which consists of basalt and sediments and the groundwater stored in these materials, is one of the largest aquifers in the United States (Irving 1993) and was classified as a sole-source aquifer by the EPA in 1991 (56 FR 50634).

The vadose zone is a particularly important component of the INEEL hydraulic system. First, the thick vadose zone affords protection to groundwater by acting as a filter and preventing many contaminants from reaching the SRPA. Second, the vadose zone acts as a buffer by providing storage for large volumes of liquid or dissolved contaminants that have spilled on the ground, have migrated from disposal pits and ponds, or have otherwise been released to the environment. Finally, the vadose zone is important because transport of contaminants through the thick, mostly unsaturated materials can be slow if low infiltration conditions prevail.

An extensive vadose zone exists at the INEEL ranging in thickness from 61 m (200 ft) in the north to greater than 274 m (900 ft) in the south and consists of surficial sediments, relatively thin horizontal basalt flows, and occasional interbedded sediments (Irving 1993). Surface sediments in the vadose zone include clays, silts, sands, and some gravels. Thick surficial deposits of clays and silts are found in the northern part of the INEEL, but the deposits decrease in thickness to the south where some basalt is exposed at the topographic surface. Approximately 90% of the vadose zone comprises thick sequences of interfingering basalt flows. These sequences are characterized by large void spaces resulting from fissures, rubble zones, lava tubes, undulatory basalt-flow surfaces, and fractures. Sedimentary interbeds found in the vadose zone consist of sands, silts, and clays and are generally thin and discontinuous. Sediments may be compacted because of original deposition and subsequent overburden pressures. Under unsaturated conditions with limited water, flow will move preferentially through small openings in sediment or basalt, avoiding large openings.

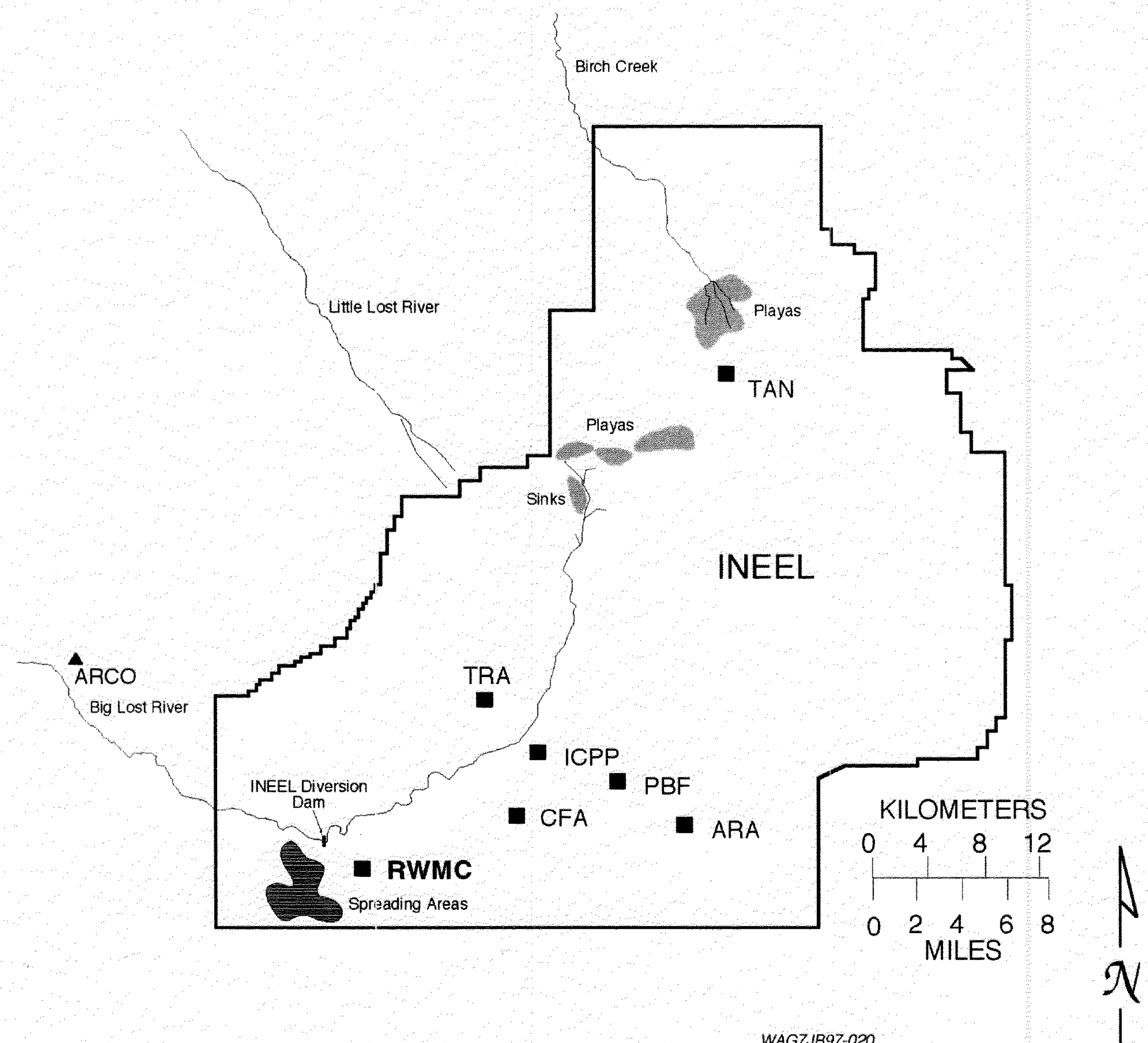


Figure 2-14. Surface water features of the INEEL.

Perched water at the INEEL forms when a layer of dense basalt or fine sedimentary materials occurs with a hydraulic conductivity that is sufficiently low so that vertical movement of the water is restricted. Once perched water develops, lateral movement of the water can occur, perhaps by up to hundreds of meters. When perched water accumulates, the hydraulic pressure head increases and water filters through the less permeable perching layer and continues its generally vertical descent. If another restrictive zone is encountered, perching again may occur. The process can continue, resulting in the formation of several perched water bodies between the land surface and water table. The volume of water contained in perched bodies fluctuates with the amount of recharge available from precipitation, surface water, and anthropogenic sources. Perching behavior tends to slow the downward migration of percolating fluids that may be flowing rapidly under transient, near-saturated conditions through the vadose zone. Historically, perched water has been found beneath INTEC, RWMC, ANL-W, and TRA.

The SRPA is defined as the saturated portion of a series of basalt flows and interlayered pyroclastic and sedimentary materials that underlie the ESRP east of Bliss, Idaho. It extends from Bliss and the Hagerman Valley on the west to Ashton and the Big Bend Ridge on the northeast. Its lateral boundaries are formed at the points of contact of the aquifer with less permeable rocks at the margins of the plain. The SRPA arcs approximately 354 km (220 mi) through the eastern Idaho subsurface and varies in width from approximately 80 to 113 km (50 to 70 mi). The total area of the SRPA is estimated at 24,862 km^2 (9,600 mi^2). The depth to groundwater at the INEEL ranges from approximately 61 m (200 ft) bgs in the north to more than 274 m (900 ft) bgs in the south (Becker et al. 1998). The aquifer contains numerous, relatively thin basalt flows extending to depths of 1,067 m (3,500 ft) bgs. In addition, the SRPA contains sedimentary interbeds that are typically discontinuous. The SRPA has been estimated to hold 2.5E+12 m^3 (8.8E+13 ft^3) of water, which is approximately equivalent to the amount of water contained in Lake Erie, or enough water to cover the entire state of Idaho to a depth of 1.2 m (4 ft) (Hackett, Pelton, and Brockway 1986). Water is pumped from the aquifer primarily for human consumption and irrigation (Irving 1993). Compared to such demands, the INEEL's use of the aquifer is minor. The SRPA was designated as a sole source aquifer by the EPA (56 FR 50634) because it is the only viable source of drinking water for many communities on the ESRP.

Aquifer permeability is controlled by the distribution of highly fractured basalt flow tops, interflow zones, lava tubes, fractures, vesicles, and intergranular pore spaces. The variety and degree of interconnected water-bearing zones complicate the direction of groundwater movement locally throughout the aquifer. The permeability of the aquifer varies considerably over short distances, but generally, a series of basalt flows will include several excellent water-bearing zones.

The SRPA is recharged primarily by infiltration from rain and snowfall that occurs within the drainage basins surrounding the ESRP and from deep percolation of irrigation water. Annual recharge rates depend on precipitation, especially snowfall. Regional groundwater flows to the south-southwest, though locally the flow direction can be affected by recharge from rivers, surface water spreading areas, and heterogeneities in the aquifer. Estimates of flow velocities within the SRPA range from 1.5 to 6.1 m/day (5 to 20 ft/day) (Irving 1993). Flow in the aquifer is primarily through fractures, interflow zones in the basalt, and the highly permeable rubble zones located at flow tops. The SRPA is considered heterogenous and anisotropic (having properties that differ, depending on the direction of measurement) because of the permeability variations within the aquifer that are caused by basalt irregularities, fractures, void spaces, rubble zones, and sedimentary interbeds. The heterogeneity is responsible for the variability in transmissivity (which is a measure of the ability of the aquifer to transmit water) through the SRPA. Transmissivities measured in wells on the INEEL range from 1.0E-01 to 1.1E+06 m^2/day (1.1E+00 to 1.2E+07 ft^2/day) (Wylie et al. 1995). Over the vast majority of the INEEL, no MCLs were exceeded. In general, water quality is preserved because the extensive vadose zone filters chemicals and pollutants from the irrigation and wastewater that pass through the aquifer. Concerns about groundwater contamination from INEEL operations have prompted an extensive monitoring system over all of the INEEL (Irving 1993).

2.4.5 Ecology

Six broad vegetation categories representing nearly 20 distinct habitats have been identified on the INEEL: juniper-woodland, native grassland, shrub-steppe off lava, shrub-steppe on lava, modified, and wetlands. Nearly 90% of the site is covered by shrub-steppe vegetation, which is dominated by big sagebrush, saltbush, rabbitbrush, and native grasses (DOE-ID 1996). In addition to the predominant sagebrush steppe communities, small riparian and wetland regions exist along the Big Lost River and Birch Creek and have been identified as sensitive biological resource areas within the site.

The INEEL serves as a wildlife refuge because a large percentage of the site is undeveloped and human access is restricted. The central part of the site is prohibited from grazing and hunting. Mostly undeveloped, this tract may be the largest undisturbed sagebrush steppe in the Intermountain West outside of the national park lands (DOE-ID 1996). More than 270 vertebrate species including 43 mammals, 210 birds, 11 reptiles, nine fish, and two amphibians have been observed at the site. During some years, hundreds of birds of prey and thousands of pronghorn antelope and sage grouse winter on the INEEL. Mule deer and elk also reside at the site. Observed predators include bobcats, mountain lions, badgers, and coyotes. Bald eagles, classified as a threatened species, are commonly observed on or near the site each winter. Peregrine falcons, which are classified as endangered, also have been observed. In addition, nine candidate species for listing as threatened or endangered may either inhabit or migrate through the area. Of these nine species, the pygmy rabbit, three species of bats, and some species of ants are currently under study at the site. Other candidate species that may frequent the area include ferruginous hawks, Townsend's big-eared bats, burrowing owls, and loggerhead shrikes. This list of species is compiled from a letter from the U.S. Fish and Wildlife Service (2000) for threatened or endangered and sensitive species listed by the Idaho Department of Fish and Game (IDFG) Conservation Data Center (CDC) web site and Radiological Environmental Sciences Laboratory documentation for the INEEL (Reynolds, et al. 1986).

2.4.6 Demography and Land Use

2.4.6.1 Demography. Populations potentially affected by INEEL activities include INEEL employees, ranchers who graze livestock in areas on or near the INEEL, hunters on or near the INEEL, and residential populations in neighboring communities.

2.4.6.1.1 On-Site Populations. Nine separate facilities at the INEEL include a total of approximately 450 buildings and more than 2,000 other support facilities. In January 1996, the INEEL employed 8,616 contractor and government personnel. Approximately 40% of the total work force is located in Idaho Falls, Idaho, and 60% is employed at the INEEL site (DOE-ID 1996).

Approximately 1,162 employees are located at the INTEC. Employee totals at other INEEL locations are approximately 883 at the CFA, 190 employees at the RWMC, 360 at TAN, 470 at TRA, 112 at the Power Burst Facility, 1,300 at the Naval Reactors Facility (NRF), 750 at ANL-W, and 10 within the remaining sitewide areas. In addition, approximately 3,400 INEEL employees occupy numerous offices, research laboratories, and support facilities in Idaho Falls (DOE-ID 1996).

2.4.6.1.2 *Off-Site Populations.* The INEEL site is bordered by five counties: Bingham, Bonneville, Butte, Clark, and Jefferson (Figure 2-15). Major communities include Blackfoot and Shelley in Bingham County, Idaho Falls and Ammon in Bonneville County, Arco in Butte County, and Rigby in Jefferson County. Population estimates for the counties surrounding the INEEL and the largest population centers in these counties are shown in Table 2-5 (Becker et al. 1998). The nearest community to the INEEL is Atomic City, located south of the site border on U.S. Highway 26. Other population centers near the INEEL include Arco, west of the site; Howe, west of the site on U.S. Highway 22/33; and Mud Lake and Terreton on the northeast border of the site.

2.4.6.2 *Land Use.* The primary use of INEEL lands is to support facility operations and act as buffer and safety zones around the facilities. Virtually all of the work at the INEEL is performed within the site's primary facility areas (i.e., CFA, TRA, and INTEC). These areas, however, occupy only about 2% of the total INEEL land area. Other land uses include environmental research, ecological preservation, and socio-cultural preservation. INEEL land is also used for grazing, recreation, and connecting infrastructure, with the remaining land being essentially undisturbed.

Currently, INTEC has a total land area of 200 acres and 106,070 m^2 (1,141,711 ft^2) of facilities. Land at INTEC is used to store SNF and radioactive waste for DOE. Before April 1992, SNF were reprocessed at the plant. With the DOE decision to cease reprocessing operations, however, the need to store greater quantities of these fuels increased.

The Bureau of Land Management (BLM) classified the acreage within the INEEL as industrial and mixed use (DOE 1991). The primary use of INEEL land is to support facility and program operations dedicated to SNF management, hazardous and mixed waste management and minimization, cultural resources preservation, and environmental engineering, protection, and remediation. Large tracts of land are reserved as buffer and safety zones around the boundary of the INEEL. Portions within the central area are reserved for INEEL operations. The remaining land within the core of the reservation, which is largely undeveloped, is used for environmental research, ecological preservation, and sociocultural preservation.

Table 2-5. Population estimates (1990) for selected counties and communities surrounding the INEEL and selected communities (Becker et al. 1998)

Location	Population Estimate
Bingham County	39,613
Blackfoot	9,300
Shelley	3,400
Clark County	798
Bonneville County	77,395
Ammon	4,800
Idaho Falls	42,200
Butte County	2,940
Jefferson County	17,486
Rigby	2,600

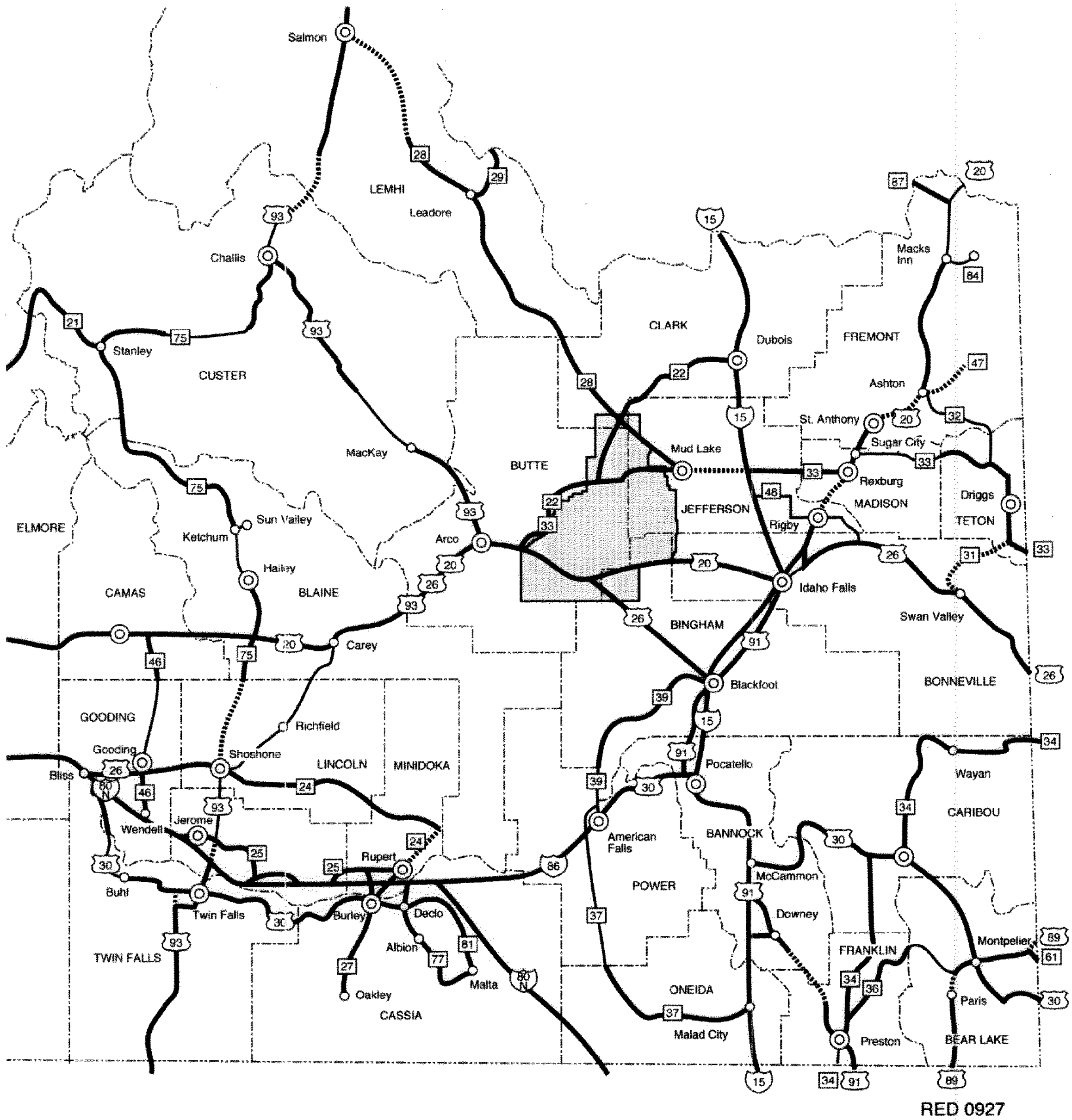


Figure 2-15. Counties adjacent to the INEEL.

The buffer consists of 1,295 km^2 (500 mi^2) of grazing land (DOE 1991) administered by the BLM. Grazing areas at the INEEL, shown in Figure 2-16, support cattle and sheep, especially during dry conditions. Depredation hunts of game animals, managed by the IDFG, are permitted onsite within the buffer zone during selected years. Hunters are allowed access to an area that extends 0.8 km (0.5 mi) inside the INEEL boundary on portions of the northeastern and western borders of the site (Becker et al. 1998).

State Highways 22, 28, and 33 cross the northeastern portion of the site, and U.S. Highways 20 and 26 cross the southern portion (Figure 2-16). One hundred forty-five km (90 mi) of paved highways used by the general public pass through the INEEL (DOE 1991), and 23 km (14 mi) of Union Pacific Railroad tracks traverse the southern portion of the Site. In the counties surrounding the INEEL, approximately 45% of the land is used for agriculture, 45% is open land, and 10% is urban, (DOE 1991). Livestock uses include the production of sheep, cattle, hogs, poultry, and dairy cattle (Bowman et al. 1984). The major crops produced on land surrounding the INEEL include wheat, alfalfa, barley, potatoes, oats, and corn. Sugar beets are grown within about 40 mi of the INEEL in the vicinity of Rockford, Idaho, southeast of the INEEL in central Bingham County.

Most of the land surrounding the INEEL is owned by private individuals or the U.S. government. The BLM administers the government land on the INEEL (Figure 2-16).

2.4.6.3 Future Land Use. Future land use scenarios were established in 1995 in *Long-Term Land Use Future Scenarios for the Idaho National Engineering Laboratory* (DOE-ID 1995) and further addressed in the *Comprehensive Facility and Land Use Plan* (DOE-ID 1996). Because future land-use scenarios are uncertain, assumptions were made in the INEEL future land-use scenarios document for defining factors such as development pressure, advances in research and technology, and ownership patterns. The following assumptions were applied to develop forecasts for land use within the INEEL:

- The INEEL will remain under government ownership and control for at least the next 100 years. The boundary is static. (However, the DOE land-use document [DOE 1994] indicates that the boundaries of the INEEL may shrink.).

- The life expectancy of current and new facilities is expected to range between 30 and 50 years. The decontamination and dismantlement process will commence following closure of each facility if new missions for the facility are not determined.

- No residential development (e.g., housing) will occur within the INEEL boundaries within the institutional control period.

- No new major, private developments (residential or nonresidential) are expected in areas adjacent to the INEEL.

Future land use most likely will remain essentially the same as the current use: a research facility within the INEEL boundaries and agriculture and open land surrounding the INEEL. Other potential, but less likely, land uses within the INEEL include agriculture and the return of the areas onsite to their natural, undeveloped state.

INTEC was one of the facilities that had a future use scenario projected. The scenarios are broken down into the present situation, as well as for the next 25, 50, 75, and 100 years.

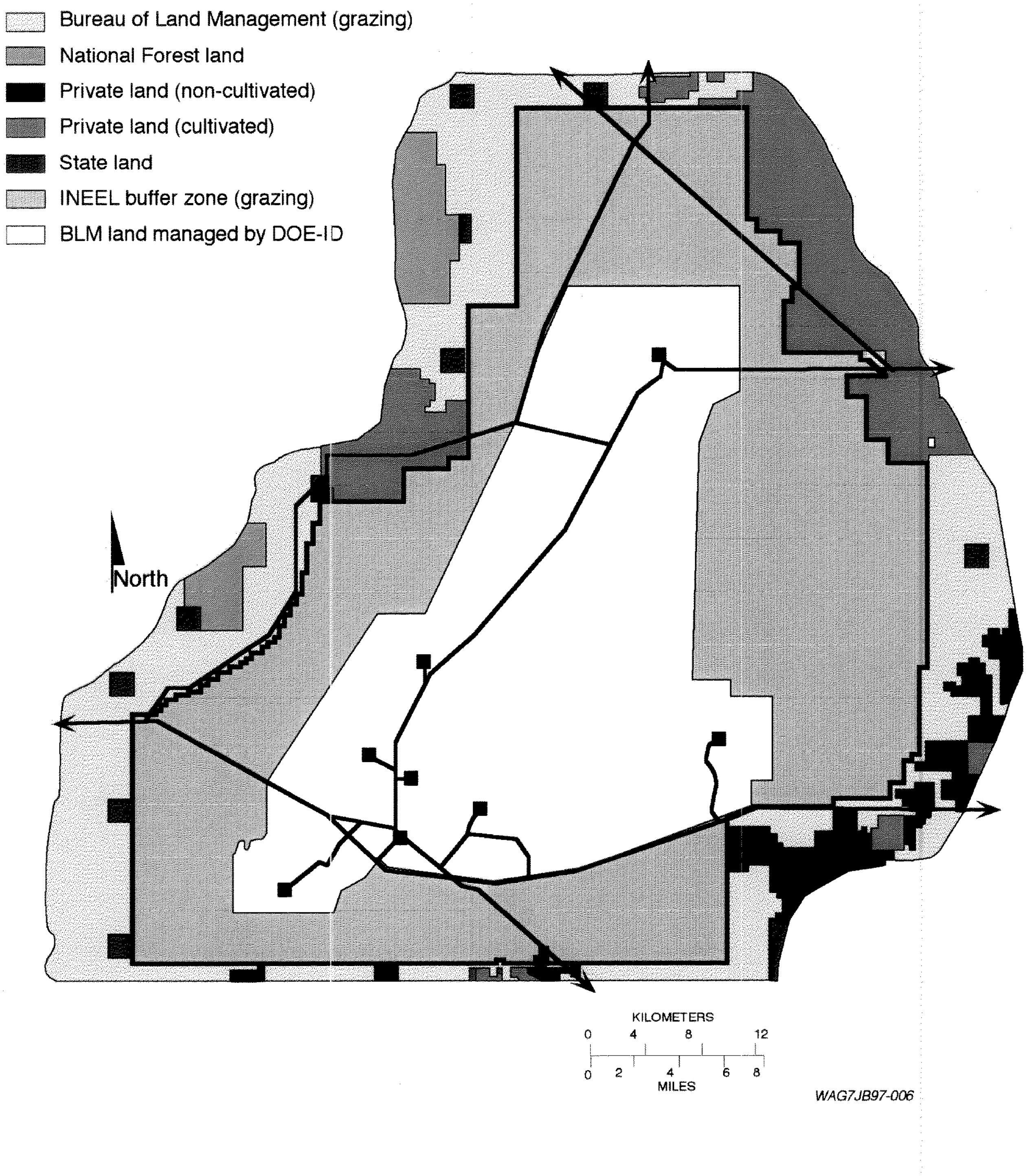


Figure 2-16. Land ownership distribution in the vicinity of the INEEL.

Present:	Interim storage of SNFs, disposition of fuels, managing waste and improving waste and water management techniques.
25-Year:	Continue use as industrial area, planned new waste treatment facility.
50-Year:	Approaching end of useful life if no new mission identified, decontamination and dismantlement with all or selected areas for restricted industrial use.
75-Year:	Standby mode for restricted industrial use; reuse permitted, but no new development outside existing fence line.
100-Year:	Continuation as a restricted industrial area.